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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,274	03/24/2004	Kazutaka Akiyama	04173.0446	3986
22852 7590 08/09/2007 FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP 901 NEW YORK AVENUE, NW WASHINGTON, DC 20001-4413				
			EXAMINER ANDUJAR, LEONARDO	
			ART UNIT 2826	PAPER NUMBER
			MAIL DATE 08/09/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No. 10/807,274	Applicant(s) AKIYAMA, KAZUTAKA	
	Examiner Leonardo Andújar	Art Unit 2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 5/21/200.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 3-6,8,10,12,14 and 16-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,7,9,11,13 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |                                                                                         |                                                                             |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                                |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____                                                             | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of claims 1, 2, 7, 9, 11, 13 and 15 in the reply filed on 08/11/2006 is acknowledged.

### ***Priority***

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### ***Claim Rejections - 35 USC § 103***

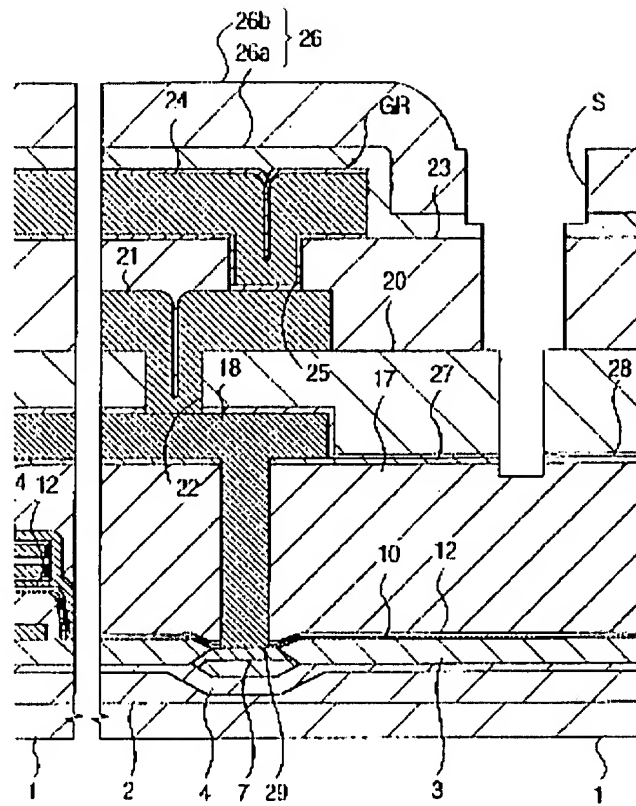
3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 7, 9, 11, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suwanai et al. (US 5,994,762) in view of Wolf further in view of Kishida (US 6,770,977).
5. Regarding claims 1, 2, 13 and 15, Suwanai (e.g. fig. 11) shows a semiconductor device comprising: a semiconductor substrate 1; a first insulating film 17/27 formed above the semiconductor substrate and having a relative dielectric constant; a conductor 18 (e.g. aluminum/tungsten, col. 2/lls. 5-11) which covers a side face of the first insulating film at least near four corners of the semiconductor substrate (note that 18 is part of a guard ring GR, see fig. 3), and a second insulating film 20 covering the

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outer side face of the conductor and having a relative dielectric constant of over 3.8 (inherent property of BPSG).



Suwanai does not teach that the first insulating layer has a relative dielectric constant of less than 3.8 nor a barrier layer on the at least an outer side face. Nevertheless, Wolf teaches that integrated circuits include a plurality of devices interconnected by multilevel interconnections including dielectric layers (pg 716-727). Also, the interconnect delay can be reduced by using low k dielectric material (e.g. nanoporous silica ( $\text{SiO}_2$ ) "ultra low") having a dielectric constant of less than 2.0 (pgs.

791-795). Kishida (e.g. fig. 8b) teaches a barrier layer 202/203 composed tantalum nitride/tantalum is formed on an outer surface a conductor layer to prevent the metal atoms of the conductive layer from diffusing to the semiconductor substrate (col. 2/lis. 50-59 7 col. 8/lis. 26-28). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a low k dielectric material (e.g. nanoporous silica SiO<sub>2</sub>) having a dielectric constant of less than 2.0 for the first dielectric layer disclosed by Suwanai in order to reduce the interconnect delay as taught by Wolf and to include a barrier layer on an outer surface a conductor layer disclosed by Suwanai in view of Wolf to prevent the metal atoms of the conductive layer from diffusing into the semiconductor substrate.

6. Regarding claim 7, Suwanai shows that the second insulating film also covers an upper side of the first insulating film and a conductor 21 passing through the second insulating film positioned on the upper side of the first insulating film.

7. Regarding claim 9, Suwanai shows a conductive pattern buried in the first insulating film (e.g. 11, 15).

8. Regarding claim 11, Suwanai shows that the first insulating film is constituted of a plurality of layers 17/27.

### ***Response to Arguments***

9. Applicant's arguments filed 5/21/2007 have been fully considered but they are not persuasive.

10. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections

are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

11. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Wolf teaches that the interconnect delay can be reduced by using low k dielectric material (e.g. nanoporous silica (SiO<sub>2</sub>) "ultra low") having a dielectric constant of less than 2.0 (pgs. 791-795) whereas Kishida teaches that a barrier layer composed tantalum nitride/tantalum is formed on an outer surface a conductor layer to prevent the metal atoms of the conductive layer from diffusing to the semiconductor substrate (col. 2/lis. 50-59 7 col. 8/lis. 26-28).

12. Regarding Applicant's argument that the Suwanai et al. teaches away from combining the references to obtain the semiconductor device recited in claim 1. It is respectfully noted that Suwanai does not disclose or suggest that a low k dielectric material (e.g. nanoporous silica (SiO<sub>2</sub>) "ultra low") can be used as first insulating layer. Also, the Examiner disagrees that Suwanai teaches away from combining the references as suggested by the Examiner because Suwanai et al. teaches forming each

of the insulating films (20, 23, 17, and 27) both inside the guard ring (GR) and outside the guard ring simultaneously. As shown in figures 5 and 6 the insulating films are not simultaneously formed. Furthermore, Suwanai nor Wolf teaches or suggests that nonporous silica would make the first insulating layer susceptible to damage from cracking or peeling outside the guard ring when the semiconductor wafer is diced.

### ***Conclusion***

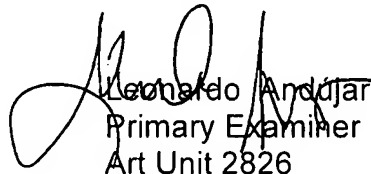
13. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonardo Andújar whose telephone number is 571-272-1912. The examiner can normally be reached on Mon through Thu from 9:00 AM to 7:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Leonardo Andujar  
Primary Examiner  
Art Unit 2826

8/04/2007